nance of oaks, has in fifty years been nearly attained. Probably the conditions are too severe to permit the eventual appearance of the climax formation (maple-beech), except in the more sheltered parts of the area. This study also shows what may be accomplished by a determined man in covering a naked area with beautiful and useful trees. The best way to utilize much of the unproductive land in this state is to plant suitable trees and treat them in accordance with the accepted principles of forestry.

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EXPLANATION OF PLATE 62, Fig. 1. Woods Hole about 1850, from east side of Little Harbor. Outline copy of an old water-color in the possession of Miss Sarah B. Fay. Fig. 2. Photograph taken in 1897 from the same point as in figure 1.

PLATE 63, Fig. 1. Krummholz on shore of Buzzards Bay, viewed from the south. Fig. 2. A rather open part of the forest, showing the unhealthy Scotch pines, and young oaks replacing them.

THE NORTH AMERICAN SPECIES OF ERIOPHORUM.

M. L. FERNALD.

PART 2. NOTES ON THE PRECEDING SYNOPSIS.[1]

GENERIC STATUS OF ERIOPHORUM.

LINNAEUS, in first defining the genus *Eriophorum*,[2] referred to a figure of Micheli's *Linagrostis*.[3] This figure, although a conventionalized drawing, represents an ovoid spikelet with very numerous scales, and dissections of the spikelet, showing a perianth of numerous bristles. From this old figure one may safely infer that the original *Eriophorum* as interpreted by Linnaeus in his Genera Plantarum was a plant very near if not the European *E. vaginatum*. Later, in the Species Plantarum,[4] Linnaeus distinguished four species of *Eriophorum*, the European *E. vaginatum* and *E. polystachion*, the American *E. virginicum*, and the European *E. alpinum*, species which have subsequently stood as typical of *Eriophorum*, although, in 1772,

[1] RHODORA, vii. 81–92.
[2] L. Gen. 12 (1737).
[3] Micheli, Nov. Gen. 53, t. 31 (1729).
[4] L. Sp. 52, 53 (1753).

Scapoli[1] revived for the three European species the prelinnean generic name *Linagrostis*.

In the second edition of the Species Plantarum, however, Linnaeus added to his *Eriophorum*, *E. cyperinum*,[2] the type of a large American group of species, the Wool Grasses, whose affinities are with *Scirpus*, a fact which Linnaeus himself suspected as shown by his note: "*statura omnino* Cyperi, *sed Spiculæ* Scirpi, *nisi Semina maturescentia producerent Lanam gilvam S. testaceam, vix spiculis longiorem.*" By those systematists who have followed Linnaeus in including with the true Eriophorums having long straight flattened bristles, the very dissimilar *E. cyperinum* with crinkled and strongly curled terete bristles, such generic distinctions as otherwise separate the genera *Eriophorum* and *Scirpus* are obscured and the former separated from the latter merely by the perianth bristles without barbs and more or less exceeding the scales of the spikelets.

That this treatment would place the two genera upon an absurdly weak footing is well shown by three nearly related species. *Scirpus Peckii*, Britton, is habitally closely similar on the one hand to the Wool Grass, *Eriophorum lineatum*, Benth. & Hook., and on the other hand so close to the unquestioned *Scirpus*, *S. polyphyllus*, Vahl., that in his original description a specimen of the latter was confused by Dr. Britton with the Peck specimen.[3] Yet, *Eriophorum lineatum* has curly elongate barbless bristles which place it near *E. cyperinum*. L.; *Scirpus polyphyllus* has the bristles barbed much as in *S. atrovirens*, but usually bent or slightly curled; and *Scirpus Peckii*, with bristles elongated and curled much as in *Eriophorum lineatum*, often has a few weak barbs at the tip. These plants, obviously inseparable as genera, all have innumerable small spikelets, small appressed scales, and 6 perianth-bristles, and by many authors they are maintained as members of the genus *Scirpus*,[4] a course which seems rational and open to no question.

[1] Scop. Fl. Carn. ed. 2, i. 47 (1772).

[2] L. Sp. ed. 2, 77 (1762).

[3] See Brainerd, RHODORA, iii. 32 (1901).

[4] *Eriophorum japonicum*, Maxim. Bull. Acad. Sci. St.-Pétersb. xxxi. 111 (1886 and Mél. Biol. xii. 558 (1886), in its 6 bristles somewhat scabrous at tip is clearly a *Scripus* and a full sheet of specimens in the Gray Herbarium, collected by Charles Wright on mountain tops near the Ochotsk Sea, shows it to be related on the one hand to the *Scripus sylvaticus* group, and on the other to *S. cyperinus* and its allies. This plant of the mountains of eastern Asia should be called ***Scirpus japonicus,*** n. comb.

The removal of the tall *Eriophorum cyperinum* and its numerous allies from the genus leaves what is in many ways a natural group; but as treated by Linnaeus in the first edition of the Species Plantarum and as ordinarily accepted, *Eriophorum* contains one species, *E. alpinum*, which, like the Wool Grasses, still leaves the genus unsatisfactorily distinguished from *Scirpus*. With the exception of this single species, *Eriophorum alpinum*, the members of the genus (with *E. cyperinum* and its allies removed to *Scirpus*) have many characteristics in common which define the group as a well marked genus. All have the membranous scales of the spikelets with spreading or loosely ascending tips, and the perianth of many slender ligulate bristles;[1] and in the monocephalous species, *E. vaginatum*, &c., with which *E. alpinum* has been associated, the culms are usually invested with loose often somewhat inflated membranous-tipped sheaths; the spikelets are large, of very numerous membranous or scarious spreading or spreading-ascending scales, several of the lower empty, and the outermost enlarged, 3-several-nerved and persistent.

Eriophorum alpinum, however, which has been very generally treated as a close ally of *E. vaginatum*, &c., but which, with *Scirpus cyperinus* and *S. lineatus*, was made by Persoon the basis of another genus, *Trichophorum*[2] has characteristics which separate it very clearly from *Eriophorum*. The sheaths of *Eriophorum alpinum*, confined chiefly to the base of the plant, are close and firm; the spikelets subulate-ovoid, about 5 mm. long, of few incurved-ascending chartaceous scales, the outermost of which is caducous and has its strong green costa prolonged into a blunt mucro; and the ligulate bristles are only 6 in number. In all these characteristics the plant is so closely similar to the boreal *Scirpus caespitosus*, L., and *Scirpus alpinus*, Schleicher, that more than one student of the group has commented upon the fact. Thus, in 1836, Torrey remarked that "This Eriophorum differs from all the other single-spiked species of the genus in the rigid scales of the spike, and in the definite crisped bristles";[3] and by others, as recently, in a very detailed discussion of the anatomical structure of the stems of the plants which have

[1] By some authors spoken of as ligulate segments of 6 deeply cleft bristles (see Clarke in Hook. Fl. Br. Ind. vi. 663).

[2] Persoon, Syn. i. 69 (1805).

[3] Torr. Ann. Lyc. Nat. Hist. N. Y. iii. 335 (1836).

passed as *Eriophorum*, by Palla[1] *Scirpus caespitosus* is placed with *Eriophorum alpinum* in the genus *Trichophorum*.

Limited as it was by Palla to *Trichophorum alpinum*, Pers. (*Eriophorum*, L.) and *T. caespitosum*, Schur. (*Scirpus*, L.) with barbless ligulate bristles, and *T. atrichum*, Palla (*Scirpus alpinus*, Schleicher) without bristles, *Trichophorum* would have a strong morphological basis for separation from both *Scirpus* and *Eriophorum*. In eastern North America, however, there is a plant, *Scirpus Clintonii*, Gray, which, in habit, spikelets, chartaceous scales, the outermost deciduous and with the strong green costa prolonged into a mucro, is clearly to be placed with *Trichophorum alpinum*, *T. caespitosum*, and *T. atrichum*. This plant, in its spikelets is, in fact, more like *Trichophorum* (*Eriophorum*) *alpinum* than that species is to *T.* (*Scirpus*) *caespitosum*, but its perianth-bristles are not only terete but very freely setulose. In these characteristics *Scirpus Clintonii* is close to *S. pauciflorus*, Lightf., a species which Palla very definitely excludes from *Trichophorum*.[2] Thus *Scirpus Clintonii* combines to such an extent the morphological characteristics of *Trichophorum* as interpreted by Palla and *Scirpus pauciflorus* which Palla regards as a *Scirpus* as to indicate that the characters upon which *Trichophorum* is maintained by him are not truly concomitant and that the genus is at best a subgenus of *Scirpus*, with close affinity to *S. pauciflorus* and *S. nanus*.

The plant which led to this discussion, *Eriophorum alpinum*, L., is, then, a species of *Scirpus* rather than of *Eriophorum* in its limited sense; but as there is already a *Scirpus alpinus*, Schleicher, it has been necessary in transferring *Eriophorum alpinum* to use a specific name which shall not duplicate Schleicher's already established combination, *Scirpus alpinus*. This was recently done by Ascherson and Graebner, and henceforth the densely caespitose *Scirpus* with elongate ligulate white bristles should be called *S. Trichophorum*, Ascherson & Graebner.[3]

In the paper already referred to, Palla maintains that *Eriophorum*

[1] Bot. Zeit. liv. ab. 1, 145, 151 (1896).

[2] "Hier sie auf eine unrichtige Angabe Richter's in seinen 'Plantae Europeae,' S. 139, aufmerksam gemacht. Richter führt unter den Synonymen des *Scirpus pauciflorus* Lightf. ein *Trichophorum pauciflorum* Palla auf. Ein solches ist von mir nie aufgestellt worden." — Palla, l. c. 146.

[3] Asch. & Graebn. Syn. ii. ab. 2, 302 (1903).

virginicum, L., is an endemic American genus, *Eriophoropsis*, which he separates on characters confined strictly to the anatomical structure of the stem and leaves, himself admitting that in its fruiting characters and in its bristles the plant cannot be separated from *Eriophorum*.[1] Until the anatomical characteristics maintained as distinguishing *Eriophoropsis* are corellated with some leading morphological characters of the inflorescence or the perianth, the plant will scarcely receive general recognition as a unique genus.

With the transfer to *Scirpus* of the two elements, *Eriophorum cyperinum*, L., and its allies, and *Eriophorum alpinum*, L., which made up Persoon's *Trichophorum*, the genus *Eriophorum* becomes one with strongly marked habital characteristics, and with the perianth consisting of numerous elongate flat straight bristles.

Eriophorum Chamissonis.

The status of the name *Eriophorum Chamissonis* has been the source of much perplexity, and without entering in detail into its history it is impossible to gain a just impression of its significance. On the 9th of November, 1825, Dr. C. A. Meyer presented to the St. Petersburg Academy a paper entitled "Cyperaceae Novae descriptionibus et iconibus illustratae," but the paper was not actually printed until 1831.[2] Among the species described was *Eriophorum Chamissonis*[3] based upon "*Erioph. intermedium Cham.* in litt.," not *E. intermedium*, Bastard, clearly described in more than a page of text and beautifully illustrated by a detailed plate. The plant was said to have the "Habitat in Kamtschatka et Unalaschka, nec non in alpibus Altaicis," and the very clear plate shows that it is a species well known near the coast of Alaska and Kamtschatka, extending south to Mandschuria, which is generally recognized as identical with the later *E. russeolum*, Fries, of northern Europe. If the name, *E. Chamissonis* were based solely on the description and plate of Meyer, there would be no question as to its merits; but, unfortunately, an Altai plant was also cited; and between the original drafting of the

[1] "*Eriophoropsis virginica* sieht zur Zeit der Fruchtreife einen *Eriophorum* überaus ähnlich . . . . Der Bau der Perigonborsten ist der nämliche wie bie *Eriophorum latifolium*."— Palla, l. c. 150.

[2] Mém. Sav. Étrang. Acad. St. Pétersb. i. (1831). [3] l. c. 204, t. 3 (1831).

diagnosis of the species in 1825 and its actual publication in 1831, Ledebour published in his Flora Altaica, in 1829, *E. Chamissonis*, ascribing it to Meyer, citing *E. intermedium* of Chamisso's letter and giving almost Meyer's own description of the Unalàskan and Kamtschatkan plant. Ledebour, however, in this first actual publication of *E. Chamissonis*, cited primarily plants from the Altai which subsequently proved to be unlike the Chamisso plant. Thus arose a confusion which has always been troublesome.

The exact identity of the Alati element of *Eriophorum Chamissonis* has been somewhat questionable. By Fries it was apparently taken to be *E. Scheuchzeri* (*E. capitatum*, Host)[1] but by Nylander in his Monograph the Altai element of *E. Chamissonis* is treated as *E. vaginatum*, var. *humile*,[2] the name based upon *E. humile*, Turcz. Bull. Soc. Nat. Mosc. (1838) 103, which was a *nomen nudum*; though by C. B. Clarke[3] *E. vaginatum*, var. *humile*, Nylander, is referred without question to the stoloniferous noncaespitose *E. Scheuchzeri*. A sheet of the original Altai material sent from the Herbarium of the St. Petersburg Academy to the Gray Herbarium and labeled in the characteristic hand of C. A. Meyer "*Eriophorum Chamissonis* C. A. M. *Fl. Alt.*" represents a densely caespitose non-stoloniferous plant closely related to *E. vaginatum* and quite inseparable from the original very clear figure of *E. callitrix*, Chamisso.[4] There can be no question, then, from this authentic material, of the identity of the Altai component of *E. Chamissonis*.

That the name *E. Chamissonis* should be used for the stoloniferous non-caespitose plant of Kamtschatka and Unalaska, obviously the plant collected by Chamisso, which was clearly described and illustrated by Meyer and definitely included by Ledebour in his description, seems open to little question; and in that sense, which was so clearly intended when the name was first put forward and which is indicated by the citation in the Flora Altaica of *E. interme-*

[1] "Hoc, nempe *E. Chamissonis* C. A. Meyer, est omnino *E. capitatum* Suecorum." — Fries, Novit. Mant. iii. 170.

[2] *E. vaginatum* var. "*humile* Turcz (= *E. Chamissonis* C. A. M. fl. alt.) : culmis caespitosis, vaginis fibrillosis, capitulo subsphaerico, squamis ovato lanceolatis, cinereo-pellucidis. (Siberia altaica etc.)" — Nylander, Acta, Soc. Sc. Fenn. iii. (1852), according to Andersson, Bot. Not. (1857) 58.

[3] Clarke in Hook., Fl. Brit. Ind. vi. 664 (1893).

[4] Chamisso in C. A. Meyer, Mém. Sav. Etrang. Acad. St. Pétersb. i, 203, t. 2 (1831).

dium, Chamisso, the name is taken up in this paper. Fries, himself, until he learned that the Altai plant was unlike the Kamtschatka and Unalaska specimens, treated his own *E. russeolum* as a synonym of *E. Chamissonis*, and the same course is followed by Nylander, Richter and some other European students.

Eriophorum Callitrix.

The name *Eriophorum callitrix* (or *callithrix*) has been taken up by Scandinavian authors[1] for a very slender glabrous plant which in many characters is unlike the original description and plate of Chamisso's species.[2] This original figure represents a plant whose low stoutish habit, short broadish leaves, subinflated upper sheaths, and ovate-lanceolate scales, are all unlike those of the very slender plant represented as *E. callitrix* in Flora Danica,[3] a characteristic species of broad northern range, and by no means rare in the western portions of Canada. Chamisso's description of the leaves, "sub lente margine (apice basique evidentius) tenuissime serrulato-scabra" .... and "folia fasciculorum sterilium angustiora et evidentius serrulata," is also difficult to reconcile with the almost entirely glabrous (except at the very tip) filiform leaves of the plant long treated by European botanists as *E. callitrix*.

The original plate of *Eriophorum callitrix*, however, very closely matches some northern specimens of the common American representative of *Eriophorum vaginatum*, a plant in which the leaves are usually scabrous on the margins, although the scales are often paler-margined and with more slender tips than represented in the original description and plate. In the latter character, however, the American plant, like the European *E. vaginatum*, is very variable, and many specimens show scales which in color and form are quite inseparable from those of the Chamisso plant.

As already stated in the discussion of *Eriophorum Chamissonis*, the Altai plant included in the original description of that species, and represented in the Gray Herbarium by specimens labeled by

[1] Anders. Bot. Not. (1857) 60; &c.

[2] Cham. in C. A. Meyer, Mém. Sav. Étrang. Acad. St. Pétersb. i 203, t. 2 (1831).

[3] Fl. Dan. Suppl. t. 122 (1874).

Dr. Meyer himself, is the densely caespitose comparatively stout *E. callitrix*, with depressed-globose heads, and the Altai material might easily pass as the basis of the plate accompanying Chamisso's original description.

That *Eriophorum callitrix* (in its original sense) was regarded by Chamisso and Meyer as specifically distinct from *E. vaginatum*, there is no doubt, although the unfortunate mixing of Altai specimens with the very different stoloniferous noncaespitose *E. Chamissonis* created a serious confusion. Nylander in his Monograph[1] recognized the Altai plant as at least varietally separable from *E. vaginatum*, and, judging from their description, Trautvetter and Meyer have since published it anew as *E. brachyantherum*[2] from northeastern Asia.

The slender plant taken by Scandinavian botanists as *Eriophorum callitrix* was first described by Björnström in 1856 as *E. vaginatum*, var. *opacum*, but was soon recognized by all European botanists as a species distinct from *E. vaginatum*, and they have very generally followed the lead of Andersson who supposed it to be Chamisso' *E. callitrix*. This plant (*E. opacum*) has its greatest development in the Canadian Rockies, but it extends eastward to the Great Lakes, and very locally across Arctic Asia to Spitzbergen and Arctic Scandinavia.

GRAY HERBARIUM.

GYMNOGONGRUS TORREYI (AG.) J. AG.

WILLIAM ALBERT SETCHELL.

CAROLUS AGARDH described, in 1822, in his Species Algarum (p. 254), an alga sent to him from New York by John Torrey, which he named *Sphaerococcus Torreyi*. In 1824, he repeated the description in his Systema Algarum (p. 218) in even briefer form than in the first publication. In 1830, Greville, in his Algae Brittanicae (p. LV) referred by synonym the plant, which he may never have

[1] Nylander, Acta Soc. Sc. Fenn. iii. (1852).

[2] Trautv. & Meyer in Middend. Reise, — Fl. Ochot. 98 (1856).